MROMLINCKI, M.

The determination of flat stresses by means of photoelasticity.

P. 206 (Inzvnieria I Budownictwo. Vol. 13, No. 5, May 1956, Warszawa, Poland)

Monthly Index of East European Accessions (EEAI) LC. Vol. 7, no. 2,
February 1958

MROMLINSKI, R.

"Experimental Measuring of Stresses." p. 430
"The 6th Convention of Delegates of the Polish Association of Building Engineers
and Technicians in Lublin, September 13-14, 1953." p. 433
(Inzyniera I Budownictwo, Vol. 10, No. 12, Dec. 1953, Warszawa)

SO: Monthly List of East European Accessions, Vol. 3, No. 6, Library of Congress, June,
                                                        1954, Uncl.

MRONCHENKO, F. K.

"Retaining Rain Water and Water from Melting

Snow in the Soil by Trenches", Pochvoved.,

No. 8, 1949. Persiyanovka Station, Rostov Oblast,

Azov-Black Sea Agric. Inst., Chair of General Agriculture,

-c1949-.

MROS, FELIX

MARESOVA, Zdenka; FASSATI, Milos; MROS, Felix; FASSATI, Pavel

Clinical significance of urobilirubin working test. Cas. lek.
cesk. 93 no.29:785-795 16 July 54.

1. Z III. interni kliniky Karlovy university; prednosta: prof.
MUDr J.Charvat.
        (WORK,
            capacity in liver dis., determ., urobilirubin liver
            funct. test)
        (LIVER FUNCTION TESTS,
            bilirubin test in determ. working capacity of hepatic
            patients)
        (BILIRUBIN,
            liver funct. test in determ. working capacity in hepatic
            patients)

BRUGSCH, Joachim; WIECHOWSKI, Wladyslaw; MROS, Feliks

Acute porphyria in surgery. Pol. przegl. chir. 34 no.9:873-882
'62.

1. Z I Kliniki Chorob Wewnetrznych Szpitala Charite w Berlinie
Dyrektor: prof. dr F.H. Schulz i z Kliniki Chorob Wewnetrznych
Szpitala Friedrichshain w Berlinie Dyrektor: prof. dr J. Brugsch.
          (PROPHYRIA)   (SURGERY OPERATIVE)

MROVCHINSKIY, V.S., inzh. (Vladivostok)

Experience in starting and operating VEF-25B water heating
boilers. Energetik 13 no.11:7-8 N '65.   (MIRA 18:11)

Mrovczyk, A.

Rubber rolls in operation. p. 2CO PAPIR A CELULCSA. (Ministerstvo
lesu a drevarskeho prumyslu) Praha. Vol. 9, no. 9, Sept. 1954.

SOURCE: EEAL - LC Vol. 5 No.10 Oct. 1956

MROVCSAK, Jozsef

On the eve of the sports club elections; the role of trade
unions. Magy vasut 7 no.19:6 O '63.

HERODEK, F.; MROVEC, J.

Multiple unilateral cysts of the epiglottis, root of the tongue,
palatine tonsils, nasopharynx and maxillary sinus in a woman.
Cesk. otolaryng. 14 no.5:304-308 0 ' 65.

1. ORL klinika lekarske fakulty Palackeho University v Olomouci
(prednosta - prof. dr. J. Chvojka).

BRYUKMAN, A. [Brückman, A.]; MROVETS, S. [Mrowec, S.]; VERBER, T. [Werber, T.]

Invrstigating the degree of sulfur participation in the
reaction diffusion of sulfide scale formation on nickel.
Fiz.-met. 1 metalloved. 20 no.5:702-707 N '65.

(MIRA 18:12)

1. Gornometallurgicheskaya akademiya, g. Krakov, Pol'skaya
Narodnaya Respublika.

MROVKA, S.

Complete proximity spaces. Dokl.AN SSSR 108 no.4:587-598 Je '56.
(MIRA 9:9)
1.Matematicheskiy institut Akademii nauk Pol'skey Naredney Respub-
liki. Predstavlene akademikem P.S.Aleksandrevym.
(Spaces, Generalized)

MROVEC, J.;HUBACEK, J.

Laryngeal edema in so-called Melkersson-Rosenthal syndrome.
Cesk. otolaryng. 13 no.6:363-367 N'64.

1. Otolaryngologicka klinika lekarske fakulty Palackeho
University v Olomouci (prednosta prof. dr. J.Chvojka).

KULICKA, F.; MROVED, J.

Complications following endotracheal anesthesia. Cesk.
otolaryng. 13 no.2:93-99 Ap '64.

1. Otorinolaringologicka katedra lekarske fakulty PU
[Palackeho Universita] v Olomouci (vedouci prof. dr. J. Chvojka).

MROWCZYK, S.:

Some Soviet experiments on the transfer of blast furnace to high top pressure operation.

By S. Mrowczyk ...

Hutnik, #10, Oct 55, pp349-392 & Appen.

MROWCZYK, S.

Some Soviet experiences concerning the adaptation of blast furnaces to operations

under increased pressure. p. 371

HUTNIK, Vol. 22, No. 10 October, 1955

(Panstwowe Wydawnictwa Techniczne) Katowice

SOURCE: EAST EUROPEAN ACCESSIONS LIST Vol. 5, No. 1   Jan. 1956

MROWCZYK, S.

      Soviet researches on the sintering of iron ores from Krivoi Rog.

      p. 333
      Vol. 22, no. 9, Sept. 1955
      HUTNIK
      Katowice

SO: Monthly List of East European Accessions (EEAL), LC, Vol. 5, no. 2
      Feb. 1956

H

POLAND/Chemical Technology. Chemical Products
and Their Applications. Food Industry.

Abs Jour : Ref Zhur-Khimiya, No 6, 1959, 21266

Author   : Duma, Zdzislaw; Mrowczynska, Eugenia
Inst   : -
Title   : Simplified Table of Ash Content for the
           Control of Milling Wheat and Rye.

Orig Pub : Przegl. zboz.-mlynarski, 1958, 2, No 9,
           Biul. inform. zboz. Warszawie, 2, No 4,
           6-10

Abstract : To facilitate practical utilization of
           Mohs' data (Mohs, K., Grundlagen und Ziel
           der Typisierung der Mehle nach Asche, 1933),
           complete tables were compiled of the ash
           content of rye and wheat flour with respect

Card   : 1/2

H-120

H-34

COUNTRY   :Poland
CATEGORY   :Chemical Technology. Chemical Products and Their
               Applications--Dyeing and Chemical Treatment of
ABS. JOUR.   : RZKhim., No. 16 1959, No.   59440

AUTHOR   :Mrowczynski, W., Wielopolski, A., Mizgier-
INST.   :Not given
TITLE   :The Evaluation of Some Polish Plants as Sources
               of Dyestuffs for Wool

ORIG. PUB.   :Biul Inform Inst Przemysl Drobnego, 3, No 1,
               2/8, 3-11 (1956)
ABSTRACT   :The authors describe procedures for the prepara-
               tion of dye extracts from the bark of Frangula
               alnus Mill., birch leaves (Betula alba L.), the
               rhizomes of Potentilla tormentilla Neck, the
               rhizomes of Gallium verum, the pericarp of Juglans
               regia L., the rhizomes of Polygonium Bistorta L.,
               the pericarp of Aesculus hippocastanum L., the
               green parts of Calluna vulgaris Salisb., and from
               the shells of Arachis hypogeae. The dyes were
               applied to the wool by the one-bath [mordant dyes?]

CARD: 1/2   Textile Materials.
               Jeziorek, L., and Zielinska, A.

Mrowec St.

P O L . « &

Investigation of the time of formation of calcinated phosphate. I. Bereski, E. Cryglik, F. Kammer, St. Mrowec, Piel, and T. Wesolewicz. *Przemysl Chem.* 9, 373-4 (1953)(English summary).—Expts. on the lab. and pilot-plant scale showed that the output of rotary kilns and production of the fertilizer can be increased by establishing 20 min. as the time of reaction.   Gene A. Wozny   AG (5)

ΛΙΑ C ΥΕΤ S, S.
USSR/Physical Chemistry, Kinetics, Combustion, Explosions,   B-9
     Topochemistry, Catalysis.

Abs Jour : Ref Zhur - Khimiya, No 7, 1957, 22434.

Author   : G. Deren, G. Gaber, S. Mrovets.
Inst   : Not given
Title   : Connection between catalytic activity and electric conduct-
           ivity of catalyzers mixture ZnO-Cr$_2$O$_3$.

Orig Pub : Byul. Polskoy AN, 1956, Otd III, 4, No 2, 103-107.

Abstract : Catalytic activity (CA) (i.-e. quantity of CH$_3$CHO formed by
           dehydrogenation of C$_2$H$_5$O$_4$ in a 20% mixture with water) and
           electro conductivity (σ) of the following substances are stu-
           died: 4ZnO + Cr$_2$O$_3$; 3ZnO + Cr$_2$O$_3$; 2ZnO + Cr$_2$O$_3$; ZnO + Cr$_2$O$_3$;
           ZnO + 2Cr$_2$O$_3$; ZnO + 3Cr$_2$O$_3$; ZnO + 4Cr$_2$O$_3$; ZnO and Cr$_2$O$_3$ at
           250-550°. In case of catalyzers with high contents of ZnO σ
           grows during the reaction process as on electronic semiconduc-
           tors (IZhKhim. 1956, 28534). In case of catalyzers more rich
           in Cl$_2$O$_3$ σ falls in the process of reaction at temperatures
           < 450°; at temperature > 450° σ falls at the beginning and
           then grows, as it was observed for holed semiconductors.
           (RZhKhim., 1956, 39075). For ZnO, 3ZnO + Cr$_2$O$_3$and 4ZnO + Cr$_2$O$_3$,

Card 1/2   -143-

Relation between electric conductivity and catalytic activity of ZnO–Cr₂O₃ mixed catalysts. J. Deren, J. Haber, and S. Mrowec (Bull. Acad. polon. Sci. III, 1956, 4, 107—111).—The amounts of ZnO and Cr_2O_3 in the catalyst were varied and measurements of conductivity and reaction yield in the dehydrogenation of EtOH were carried out over the temp. range of 250—550°. With ZnO rich catalysts conductivity increased and with ... rich catalysts it decreased at lower temp. ... at higher temp. it first increased and then increased. In the case of ... decrease in conductivity is accompanied by increase in reaction ... at 250 ... the dependence of the two values is taken as ... Above 400 the yield decreases.

R. J. Mader

MIRAWIEC, S,

Influence of the composition of $ZnO-Fe_2O_3$ and of $ZnO-Cr_2O_3$ mixed catalysts on their electrical conductivity and catalytic activity. A. Bielanski, J. Deren, J. Haber, and S. Mrowec (Inst. Technol., Wroclaw). Bull. acad. polon. sci., Classe III, 4, 633-6(1956)(in English).—The influence of the compn. of the catalysts $ZnO-Fe_2O_3$ and $ZnO-Cr_2O_3$ on the yield of the dehydrogenation of EtOH and on the cond. of the catalyst is reported. At const. catalyst compn. there is a linear dependence of the change in the abs. value of the log of the cond. on the reaction yield. The relation of the cond. and reaction yield to the compn. of the catalyst is more complex than in the case of the $MgO-Cr_2O_3$ system (cf. C.A. 49, 15410i).   R. Holroyd

MROWEC, ST.

Card 1/2

ARCHIWUM HUTNICTWA
Vol 2, Nr 2, 1957

6

Studies on the Mechanism of Sulfurisation of Low-percentage Copper-Aluminum
Alloys. L. Czarski, St. Mrowec and T. Werber.

In this work the kinetics of sulfurisation of pure copper and its alloys with alu-
minum (1—5% Al) was investigated. The medium in which experiments were car-
ried on was sulfur in the state of a mild boiling liquid under normal pressure. It was
stated, that the rate of the copper sulfurisation (as well as it's alloys) in these
conditions is in agreement with the parabolical law. As the concentration of alumi-
num increases in the alloy, the rate of scaling decreases. The uppermost decrease
of the scaling rate was observed in the range of 1% Al.

The sulfide scale on alloys of copper and aluminum (up to 5% Al) consists of
two layers. The external layer contains cuprous sulfide of the formula $Cu_{1.8}S$. In
this layer the presence of aluminum was not noted. The internal layer consists of
a mixture of cuprous sulfide and aluminum sulfide. The contents of aluminum in
the internal layer of the scale is not constant, but increases as we approach to the

Card 2/2

CZERSKI, L.; MROWEC, St.; WERBER, T.
Studies on the Mechanism of Sulfurisation of Low-percentage Copper-Aluminum Alloys

phase boundary metal/scale. The external layer of the scale is compact. On the contrary the existence of cracks partly filled with cuprous sulfide was stated in the internal layer. Besides this metallic inclusions of aluminum were noted in the internal scale.

Applying the marker method it was stated, that the scale on alloys of copper with aluminum forms in result of simultaneously and opposingly directed processes of diffusion of copper and sulfur. The outer layer is formed in consequence of the outward diffusion of copper ions and the internal one thanks to the inward diffusion of sulfur.

The phenomenon of the decreasing rate of scaling as the aluminum contents increases in the alloy is connected with the decrease of the active cross section of diffusion paths of copper ions in the internal layer. The active cross section of the diffusion paths of sulfur does not depend on the concentration of aluminum in the alloy.

The process of sulfurisation Cu_2S to CuS was investigated by means of the marker method and it was stated, that the CuS layer forms on Cu_2S as a result of simultaneously and opposingly directed processes of diffusion of the ions of copper and sulfur.

Stanislaw Mrowec

Mechanism of sulfurization of low percentage copper aluminium alloys. Tadeusz Czerski, Stanislaw Mrowec, and Teodor Werber (Akad. Gorniczo-Hutnicza, Krakow, Poland). *Arch. Hutnictwa* 2, 183–3/2(1957)(English summary).—Expts. were carried out on the kinetics of sulfurization of Cu and Cu-Al alloys contg. 1–5% Al. The rate const. $K \times 10^8$ was equal to 6000 for Cu, decreasing parabolically to 65 for the 4.95% Al-contg. alloy. The sulfide scale on alloys consists of 2 layers, the external contg. Cu_2S and no Al, and the internal one contg. sulfides of both metals and metallic Al. The process is explained as due to opposingly directed diffusion of Cu ions and S. Growing Al content decreases the active cross section of diffusion path in Cu, and even the value of K. The mechanism of sulfurization of Cu_2S to CuS is explained in the same way.   A. Kreglewski

MROWEC, S.

The mechanism of sulfurization of copper-zinc alloys. Lucjan Cierski, Stanisław Mrowec, and Teodor Werber. (Akad. Górniczo-Hutnicza, Kraków, Poland). *Arch. Hutnictwa* 2, 301-40(1957)(English summary).—The kinetics were detd. of sulfurization of Cu-Zn alloys (I) (contg. 1-20% Zn) in boiling S. The process occurs according to a parabolic law and its rate decreases with increasing Zn concn. Two layers of sulfide scale exist, an external one composed of $Cu_{1.x}S$, and an internal one—a mixt. of Cu_2S and ZnS in varying ratios. A scheme of the countercurrent diffusion of Cu ions and S is suggested. The rate of sulfurization is detd. by Cu migration for I contg. up to 7% Zn, and by both Cu and S for those contg. 7-16% Zn. A comparison is made with the oxidation mechanism of I detd. by Dunn and Rhines.   \. Kreslewski

MROWEC, S.

1622

Czerski L., Mrowec S., Werber T. The Mechanism of Sulphurization of Copper and its Alloys.

"Badania mechanizmu siarkowania stopów miedzi z cynkiem". Archiwum Hutnictwa (PAN), No. 4, Kraków, 1957, pp. 381–410.

In this work, the kinetics of sulphurization of Cu-Zn alloys of zinc amounting to from 1 to 20% were investigated in a liquid boiling sulphur. It was observed that with the increasing concentration of zinc in the alloy, the rate of sulphurization decreases. The rate of sulphurization of alloys with zinc up to 6% and 20% occurs according to the parabolic law. But in the case of sulphurization alloys from 7 to 15% Zn there appear deviations from the parabolic law causing a decrease in the rate of sulphurization. The sulphide scale on the alloys investigated has a double layer structure. The external layer of the scale consists of cuprous sulphide of the formula $Cu_{1,n}$. The internal layer is a mixture of cuprous and zinc sulphides. The composition of the internal layer is not constant. The content of copper in this layer decreases in the direction of the phase boundary scale/metallic core. The ratio of thickness (the external layer to the internal) changes with alterations in the concentration of zinc in the alloy. Up to 7% Zn, the external layer is the thicker; in the range 7 to 15% Zn both layers are almost the same, and with greater zinc concentration, the internal layer becomes thicker than the external one. For a 20% alloy, a thin layer of CuS was observed on the phase boundary scale/sulphur. By means of the marking method, it was demonstrated that in the whole range of concentration in the alloy, the external scale layer forms as a result of an external diffusion of copper ions, and the internal layer is a consequence of an inward diffusion of sulphur. In the internal

The Mechanism of Dezincification of Copper Zinc Alloys

MROWEC, Stanislaw

Distr: 4E3d

18

Oxidation of metals at high temperatures. Stanislaw
Mrowec, Dominik Wajszel, and Teodor Werber (Akad.
Gorniczo-Hutnicza, Krakow). Wiadomosci Chem. 11,
95–127(1957).—A review with 70 references.   Ar-Kr—.

MROWEC, STANISLOW

POLAND / Chemical Technology. Chemical Products   H-4
          and Their Application. Corrosion. Protection
          from Corrosion

Abs Jour : Ref. Zhur. - Khimiya, No 2, 1958, No 4955

Author.   : Mrowec Stanislaw, Werber Teodor

Inst   : Not Given

Title   : Effect of Treatment Procedure Applied to the
            Surface of Metals and Alloys on their Resis-
            tance to Corrosion.

Orig Pub : Hutnik (Polska), 1957, 24, No 4, 142-147

Abstract : A critical review of papers published in re-
            cent years which are concerned with questions
            relating to the dependence of corrosion re-
            sistance of metals and alloys upon the proce-
            dure utilized in treating their surface. The

Card   : 1/2

Mrowec, S.

5762   GC9.094.3

Cierski L., Mrowec S., Werber T. A Comparison of Marking Methods
in Investigations over the Mechanics of the Oxidation of Metals and
Alloys.

Porownanie metod „swiadkowania" w badaniach mechanizmu
utleniania metali i stopow." Archiwum Hutnictwa (PAN). No. 1, War-
szawa, 1956, pp. 37—48, 6 figs.

Marking methods were segregated according to the kind of marker
and the manner of its localization in the scale. There exist three
fundamental marking methods: 1) layer, 2) microscopical, and 3) auto-
radiographical. In the first method, the sub-microscopical layer of the
substance used as a marker is found in the scale by means of
a chemical or spectral analysis. In the microscopical method, the
position of the marking wire is obtained by microscopical observations
of the scale on polished specimens (perpendicularly to the wire length).
In the autoradiographical method, the position of the sub-microscopical
layer of the radio-active substance used as a marker is determined
in the autoradiographical way. Investigations carried out with marking
the same preparations by microscopical and layer method showed that
the results do not depend on the nature of the method applied. It was
also found that the autoradiographical method gives the same degree
of exactness as the layer or microscopical method. It was also
confirmed, that the noncontinual micro-layer of platinum, applied as
a marker, does not cause disturbances in the scaling process. In the
opinion of the authors, the microscopical method is the most convenient
in view of its exactness and simplicity. The use of this method makes

Conclusions of ...

... ... to connect the differences in the amounts of the
scale with the position of the marker. In conclusion, the authors give
... formula explaining the calculation of the weight-fraction of the
oxidizer compound in the process of inward diffusion from the
situation of the marker in the scale.

MROWEC S.

5772   669.14:620.193

Mrowec S., Wajszel D., Werber T. Corrosion of Iron and Steel at
High Temperatures.

„Korozja żelaza i stali przy wysokich temperaturach", Hutnik.
No. 1—2, 1958, pp. 26—43, 16 figs., 1 tab.

A discussion of the mechanism of the formation of scale on iron
and steel. Scale develops in more than one layer. At temperatures of
less than 560°C, there are two layers one of magnetite the other of
hematite. Above this temperature there are three layers since the
„Wüstite" or FeO layer forms in between the unattacked metal and
the rest of the scale. The rate at which scale develops is determined by
the rate of diffusion of iron loss through the scale. The acceleration
of scale above 560°C is due to the formation in the scale of the
„wüstite" phase, in which the concentration of empty nodes in the
cation grid may amount to 10 per cent at. In accordance with the
Wagner-Hauffe theory, such a high concentration of grid defects
cannot be reduced to any significant degree by the introduction into
the alloy of admixtures forming a solid solution with iron oxides.
The resistance of steel to corrosion at high temperatures is directly
associated with the temperature at which the „wüstite" phase appears
in the scale. The fundamental problem in obtaining good heat resisting
steel is the prevention of the formation of the „wüstite" phase in the
conditions in which the steel will be used. This can be achieved by
using such additions in the alloy as will inhibit the diffusion of iron
ions by forming spinel layers or obstructing oxide layers.

MROWEC, S.

Distr: 4E2c

Passivation is being order of silver-copper alloys
Lucian, Czech., Swoboda, Monroe, Syattym Wallach,
and Tucker (in a paper later, Kraków Univ. Kraków,
Poland).—Zeit. Elektrochem. 7, 36-39 (German summary).—Ag-Cu alloys of different contents were etched
with dil. HNO₃ and oxidized in boiling S (C.A. 52, 571(q)).
The wt. increase per unit area, or its square, increased
linearly with time, for alloys contg. Cu 1-50 or 75-80%.
Within 50-75% of Cu, a gradual transition from the
linear to the parabolic law was observed. Marking expts.
with Pt wire touching the sample surface, diam. 0.07 mm.,
microscopic observations, and chem. analysis showed that
the homogeneous scale is a Ag₂S-Cu₂S solid soln. of greater
Ag content nearer the scale/S boundary. It is formed in
outward metal diffusion. In Cu-rich alloys, the rate of
oxidation was roughly the same as in pure Cu, in agreement with Wagner-Hauffe theory (Hauffe, Oxidation von
Metallen u. Metallegierungen, 1956 (C.A. 51, 4621c)). A
lack of analogy between oxidation and sulfidization is
stressed.   I. Stacha

Mechanism of sulfidation of copper containing 5% gold.
Lucjan Czerski, Stanislaw Mrowec, and Teodor Werber
(Akad. Gorniczo-Hutnicza, Krakow, Poland). Arch. Hut-
nictwa 3, 305-13(1958)(English summary); cf. C.A. 52,
12722b.—Cu-5Au was treated with boiling S. The sulfida-
tion rate fitted the equation $m^2 = kt$, where m is mass incre-
ment per sq. cm., and t is time, and it is concluded that this
is a diffusion-controlled process. The const. k was 2.9×10^{-8} as compared with 10×10^{-8} (in c.g.s. units) for pure
Cu. The sulfide scale consisted of 2 layers formed, owing
to inward S and outward Cu diffusions. The results are
compared with Wagner's theory (C.A. 50, 16620g).

J. Steckt

Distr: 4B2c

COUNTRY   : Poland   B-9
CAT MORE   : Physical Chemistry--Kinetics, Combustion,Explosions,
                 Thermochemistry, Catalysis.
ABS. JOUR.   : RZKhim., No. 16 1959, No.   56442

AUTHOR   : Czerski, L., Mrowec, S., Wasilewowa, K., and*
INST.   : Not given
TITLE   : Investigation of the Mechanism of the Tarnishing
                 of Silver in Liquid Sulfur

ORIG. PUB.   : Arch Huta, 3, No 1, 3-23 (1958)

ABSTRACT   : The authors have applied the gravimetric method
                 to the investigation of the kinetics of the
                 tarnishing of silver (99.95% Ag) in liquid sulfur
                 at 220-444°. The quantity of Ag which reacts
                 is a linear function of the time, indicating that
                 the rate of tarnishing is determined by the reac-
                 tion at the liquid-solid interface. The energy
                 of activation for the reaction is 15,500 kcal/mol
                 at 220-300° and 5,250 kcal/mol at 300-444°. The
                 composition of the reaction product varies slightly

CARD: 1/3   *Weber, T.

                          37

B-9

COUNTRY   : Poland

CATEGORY   :

ABS. JOUR. : RZKhim., No. 16 1959, No.

56442

AUTHOR   :

INST.   :

TITLE   :

ORIG. PUB. :

ABSTRACT   : with the distance from the boundaries between the various phases. In the neighborhood of the Ag_2S-Ag interface, the composition of the product corresponds to the formula $Ag_{2.02}S - Ag_{2.04}S$, whereas in the neighborhood of the Ag_2S-S inter-face the product has the composition $Ag_{1.75}S-Ag_{1.90}S$. The marker method was used in confirming the previously obtained results (C. Wagner, Z phys Chem, B21, 25,(1933)) which indicate that the growth of the sulfide layer proceeds by diffusion

CARD: 2/3

MROWEC, S.; WERBER, T.; CZERSKI, L.

The mechanism of forming a two-layer oxide scale on copper and zinc alloys.   p. 113

ARCHIWUM HUTNICTWA   (Polska Akademia Nauk, Komitet Hutnictwa)   Warszawa, Poland.
Vol. 3, no. 2, 1958

Monthly List of East European Accessions. (EEAI) LC, Vol. 8, no. 9, September 1959.
Uncl.

MROWEC, S.
WAJSZEL, D.
WERBER, T.

Oxidation of metallic alloys at high temperatures. p. 709.

WIADOMOSCI CHEMICZNE. (Polskie Towarzystwo Chemiczne)
Wroclaw. Vol. 12, no. 11, Nov. 1958
Poland/

Monthly List of East European Accessions Index (EEAI), LC, Vol. 8, no. 6, June 1959
Uncl.

POLAND / Chemical Technology.   Chemical Products and   H-4
Their Application. Corrosion. Corrosion
Control.

Abs Jour: Ref Zhur-Khimiya, No 1, 1959, 1607.

Author : Mrowec, St., Wajazel, D., Werber, T.
Inst   : Not given.
Title   : The Corrosion of Iron and Steel at High
          Temperatures.

Orig Pub: Hutnik (Polska), 1958, 25, No 1-2, 26-34.

Abstract: The general regularities in gaseous corrosion
          processes are considered, particularly the
          problems of oxygen diffusion toward the metal
          surface, formation of films (F), reactions oc-
          curing on the boundary of the metal - F inter-
          phase. The correlation between defects in the
          crystalline lattice of a metal and the nature of
          the F being formed are discussed and oxide of F

Card 1/3

POLAND / Chemical Technology. Chemical Products and   H-4
Their Application. Corrosion. Corrosion
Control.

Abs Jour: Ref Zhur-Khimiya, No 1, 1959, 1607.

Abstract: 4) melting temperatures of a series of metals,
maximum temperature applied in basic con-
struction metals,

5) mathematical treatment of the processes of
gaseous corrosion.
-- F. Slomyanskaya.

Card 3/3

F. MROWEC, S.

Distr: 4E3c   47

Type of semiconductor of mixed crystals under the enrichment of silver ... Daniel, I. Schwartz, L. Meyer, and T. Weber (Acad. Kaiser, Vienna).—After the enrichment of Ag by liquid 5 two zone boundaries AgS/Ag and AgS/S liquid can be observed. Both zones are n-type semiconductors. Excess S in the neighborhood of the phase boundary AgS/S is present in form of atoms or ions.   F. Schwartzer

MROWEC, S.

The _____ of _____ of _____ in _____ vapor. _____ and T. _____ (_____ Akad. Iz-_____). _____ _____, ___ (1___).—Cor-rection of C.A. 5_, _____. The first _____ should read: A polished Armco iron sheet was _____ with a Pt wire and exposed to S vapor at 600° and a S pressure of 1 mm. Hg. E. L. C.

MIKULSKI, J.; MROWEC, S.; WERBER, T.

Examination of the sulfuration mechanism of Cu-Zn alloys by the use of ^{35}S radioisotopes. Bul Ac Pol chim 7 no.8:547-551 '59.   (EEAI 10:4)

1. Osrodek Fizyki Jadrowej Institutu Badan Jadrowych w Krakowie i Institut Chemii Ogolnej, Akademii Gorniczo-Hutniczej w Krakowie. Vorgelegt Von H.Niewodniczanski.
          (Sulfuration)   (Copper-zinc alloys)   (Sulfur)
                        (Radioisotopes)

MIKULSKI,J.; MROWEC,S.; WERBER,T.

Investigations of the silver sulfurizing mechanism by the use of
^{35}S radioactive isotopes. Bul Ac Pol chum 7 no.10:737-741 '59.
(EEAI 9:6)
1. Zentrum für Kernphysik (Krakau), Institut für Kernforschung.
Katedra Chemii Gorniczej, Akademia Gorniczo-Hutnicza, Krakow.
Vorgelegt von H.Niewodniczanski.
(Sulfuration)   (Silver)   (Radioisotopes) (Sulfur)

MROWEC, S

Distr: 4E2c

Relation between the oxidation rate of alloys and their composition. Stanisław Mrowec and Teodor Werber (Akad. Górniczo-Hutnicza, Kraków, Poland). Roczniki Chem. 33, 1241-4(1959)(German summary).—The const. of rate of oxidn. (sulfurization) k of binary alloys is given by the empirical relation $k = A.e^{-BN}$, where N is the mole fraction of one of the components, and A and B are consts. Three distinct straight sections are observed for a given system when log k is plotted vs. N, i.e. when the compn. of the alloy is changed.
A. Kręglewski

MIKULSKI, Jan; MROWEC, Stanislaw; STRONSKI, Ignacy; WERBER, Teodor

Study of the mechanism of sulfurization of copper with the aid of
the 35S isotope. Rocz chemii 33 no.6:1285-1290 '59.   (EEAI 9:9)

1. Instytut Badan Jadrowych Polskiej Akademii Nauk, Krakow i
Katedra Chemii Gorniczej Akademii Gorniczo-Hutniczej, Krakow
     (Copper)   (Sulfuration)   (Radioisotopes)   (Sulfur)

MROWEC, S.

3
1

Oxidation of nickel at higher temperatures. S. Mrowec, ... Weber (Akad. Krakow, Poland). ... . (in ....); cf. C.A. 53, 120414.—In the sulfurization of Ni at least 60% of the reaction occurs by the outward diffusion of the metal according to $\frac{1}{2} S_{...} \rightleftharpoons S^-$ .... in .... $+ \oplus$; $S^- \rightleftharpoons NiS + Ni_{\square}^{''} + \oplus$, where $Ni_{\square}^{''}$ is a hole in the Ni lattice and $\oplus$ is an electron hole. Inner diffusion of the oxidant is responsible for the remainder. The expts. were carried out at 580 and 630° with polished Ni plates marked with a Pt wire which, in the sulfurized sample, was on the boundary of a compact coarse outer and a fine porous (approx. $\frac{1}{3}$ as thick) inner layer of NiS.

B. M. V....

Distr: 4B2c

MROWIEC, Stanislaw; WERBER, Teodor

Some aspects of the formation mechanism of double-layer sulfide scales on metals and alloys. Chemia stosow 4 no.3/4:385-396 '60.
(EEAI 10:9)

1. Katedra Chemii Gorniczej Akademii Gornoczo-Hutniczej v Katowicach.

(Sulfides) (Metals) (Alloys)

P/038/60/005/001/002/002
A076/A126

AUTHORS: Czerski, Lucjan, Mrowec, Stanislaw and Werber, Teodor

TITLE: The problem of isothermy in investigations of the kinetics of
                metal oxidation

PERIODICAL: Archiwum Hutnictwa, v. 5, no. 1, 1960,   105 - 115

TEXT: The determination of the character of the kinetic law according
to which the reaction of metal oxidation occurs in its first stage at high tem-
peratures causes very much experimental difficulties. The main difficulty con-
sists in the fact, that in several cases it is not possible to obtain isothermic
or isobaric conditions of the reaction course for the reason of the great rate of
the process at its first stages. The kinetic data obtained at such conditions
for the reason of the impossibility of determining such parameters as temperature
and pressure   or concentration, lead to wrong conclusions with regard to the
kinetic law. The authors are engaged in a detailed investigation of the problem
of isothermic measurements of kinetics of the first stages of sulfurization re-
action of copper and silver in liquid sulfur. Measurements of the kinetics of
copper sulfurization were carried out on preparations having room temperature at

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P/038/60/005/001/002/002
A076/A126

The problem of isothermy in investigations ...

the beginning of the reaction and on those heated up to the temperature of the reaction medium. It was stated that the course of the first stage of the reaction depends upon the preliminary temperature of the preparation. In the case of cold plates a certain lapse of time is necessary to heat them to the reaction temperature; in the other cases there occurs an over-heating of the preparation as a result of the exothermic reaction. The phenomenon of over-heating of the preparations is closely connected with the ratio of the heat capacity to the surface of the preparation. Based on measurements of the increasing mass of the sulfurized preparations of copper and silver heated up to the reaction temperature, and based on the thermodynamical data, the quantity of the evolving heat per unit of surface after the first 5 seconds was calculated. To confirm the results of these calculations, suitable measurements of the temperatures for the silver and copper preparations were carried out. These measurements showed that for the silver preparation the temperature rises in two seconds from 444°C to 490°C and for copper to 550°C respectively. In reference to this D. Wajszel's investigations concerning the kinetics of the first stage of sulfurization of silver in boiling sulfur carried out on heated preparations do not relate to isothermic conditions and therefore do not satisfy conditions required for such measurements. There are 2 figures, and 19 references: 8 Soviet-bloc and 11 non-Soviet-bloc. The reference

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The problem of isothermy in investigations...   P/038/60/005/001/002/002
                                                       A076/A126

to the most recent English-language publication reads: Lichter B., Wagner C., J.
electrochem. Soc. 107, 1960, 168.

ASSOCIATION: Katedra Chemii Górniczej, Akademia Górniczo-Hutnicza, Kraków (De-
                partment of Mining Chemistry, Academy of Mining and Metallurgy),
                Kraków.

SUBMITTED: June 16, 1959.

Card 3/3

P/038/60/005/004/001/002
A076/A126

AUTHORS: Mrowec, Stanisław, Wallisch, Krystyna and Werber, Teodor

TITLE: Kinetics and mechanism of the reaction between sulphur and silver-zinc alloys

PERIODICAL: Archiwum hutnictwa, v.5, no. 4, 1960, 323-344

TEXT: The authors investigate the kinetics of sulphurization of Ag-Zn alloys containing from 6.0 to 68.5% of zinc. The rate of the sulphurization was measured by the balance method. Rate measurements were carried out for the whole concentration range of the investigated alloys at the temperature of 444°C. For four selected compositions the authors also investigated the relation between sulphurization rate and reaction temperature within the range of from 300 to 444°C. It was stated that the sulphurization process of the low-percentage alloys (up to 26.1% at. Zn) occurs according to the parabolic law. The values for the parabolic constants are given in Tables 1 and 2. It was found that with the increasing concentration of zinc in the alloy, the rate of sulphurization decreases

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Kinetics and mechanism of the reaction ...   P/038/60/005/004/001/002
                                                A076/A126

according to the relation given by Czerski, Mroweo and Werber in Reference
3 "Archiwum hutnictwa PAN, 3, 1959, 245", where

$$k'' = A \, e^{-BN},$$
(17)

where k'' - parabolic constant, A and B - empirical constants, N - concentra-
tion of zinc in the alloy in molar fractions. Similar to the case of sul-
phurization of Cu-Al and Cu-Zn alloys, several ranges of zinc concentra-
tions in the alloy with different values of the empirical constants A and B
in the 17, were found. The change in the values of the constants A and B
in Eq. 17 relates to a change of the energy of activation of the sulphuriza-
tion process. The values for the activation energy are given in Table 3.
The sulphurization process of alloys containing from 35.2 up to 68.5% at.Zn
occurs according to the logarithmic law, but the sulphurization rate practi-
cally does not depend on the concentration of zinc in the alloy. The scale
formed on low-percentage alloys, up to 26.1% at.Zn, consists of two layers.
The external one is homogeneous and consists of α - Ag_2S, the internal lay-
er is a heterophase mixture of sulphides α - Ag_2S and β - ZnS. Investiga-

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Kinetics and mechanism of the reaction ...   P/038/60/005/004/001/002
                                                 Ao76/A126

tions carried out by the marking method proved that the "marker" is always
on the boundary of both scale layers. Investigations concerning the rate
of growth of the external scale layer have demonstrated, that the growth
of this layer and the growth of the whole scale occur according to the para-
bolic law. The authors express their thanks to Professor, Doctor Lucjan
Czerski who guided and evaluated this work. There are 5 tables, 12 figures
and 27 references: 16 Soviet-bloc and 11 non-Soviet-bloc.

ASSOCIATION: Katedra Chemii Górniczej Akademii Górniczo-Hutniczej, Kraków
               (Department of Mining Chemistry, Academy of Mining and Metal-
               lurgy, Kraków)

SUBMITTED: October 9, 1959

Card 3/6

MIKULSKI, J.; MROWEC, S.; WERBER, T.

Research on the mechanism of sulfuration of Ag-Zn alloys by the use
of ^{35}S radioisotopes. Bul Ac Pol mat 8 no.3:179-182 '60. (EEAI 9:11)

1. Osrodek Fizyki Jadrowej, Krakow, Instytut Badan Jadrowych, PAN
Katedra Chemii Gorniczej, Akademia Corniczo-Hutnicza, Krakow.
Vorgelegt von H.Niewodniczanski.
        (Sulfuration)
        (Radioisotopes)
        (Silver-zinc alloys)
        (Sulfur)
        (Alloys)

MIKULSKI, JL; MROWEC, S.; STRONSKI, I.; WERBER,T.

On the mechanism of sulfuration of Cu-Au alloys. Bul Ac Pol mat. 8
no.3:183-186 '60.   (EEAI '9:11.)

1. Osrodek Fizyki Jadrowej, Krakow, Instytut Badan Jadrowych, PAN
i Katedra Chemii Gorniczej, Akademia Corniczo-Hutnicza, Krakow.
Vorgelegt von H.Neiwoeniczenski.
        (Sulfuration)
        (Copper-gold alloys)

MIKULSKI, J.; MROWEC, S.; STRONSKI, I.; WERBER, T.

On the mechanism of sulfuration of Cu-Zn- alloys with low Zn content.
Bul Ac Pol mat 8 no.5:333-337 '60.

1. Osrodek Fizyki Jadrowej, Krakow, PAN; Katedra Chemii Gornicso-
Hutnicsej, Akademia Gornicso-Hutnicsa, Krakow. Presented by H.
Niewodnicsanski.

(Sulfuration)   (Copper-sinc alloys)

BRUECKMAN, A.; MROWEC, S.; WERBER, T.; GILEWICZ, J.

Use of a radioactive zinc isotope in studies of the mechanism of sulphurisation of copper-zinc alloys. Bul chim PAN 8 no.9:489-492 '60.

1. Department of Physics II, School of Mining and Metallurgy, Cracov and Department of General and Coal Chemistry, School of Mining and Metallurgy, Cracov. Presented by M. Smialowski.

(Zinc)   (Isotopes)   (Sulphurization)
        (Zinc-copper alloys)

85042

18.8300   1530, 1520, 1138 only   S/126/60/010/004/011/023
                                     E111/E452

AUTHORS: Mrovets, S. and Verber, T.

TITLE: Some Basic Problems in Studying the Oxidation of Metals

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No.4,
            pp.572-580

TEXT: The authors discuss published work (Refs.1 - 31) on the
scaling of metals, including their own work (e.g. Refs.17,18).
They go on to propose a new mechanism for the formation of two-layer
scale and to point out some corrections needed for interpreting
results of investigations with inert markers.   For experimental
convenience their work was carried out not on oxidation of metals
but on their reaction with sulphur, since the latter usually
proceeds at lower temperatures and the solubility of sulphur in
most metals is less.   Flat copper and silver specimens were
sulphided in liquid sulphur at 445°C till a surface layer thick
enough to absorb the beta-radiation from the radioactive S^{35} isotope
had been formed.   Some S^{35} was then added, the experiment being
continued for different times.   The scale was stripped off the
metal residue and its activity on both sides determined.   The
results (Tables 1 and 2 for copper and silver respectively) are
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Some Basic Problems in Studying the Oxidation of Metals

contrary to those expected from investigations using inert markers
(Ref.15) or chemical analysis.   They indicate that inward diffusion
of sulphur through the outer layer is not involved in the formation
of a two-layer scale on these metals.   The authors suggest that in
the initial stage a thin layer is formed which grows by outward
diffusion of metal with plastic settling of the scale on to the
metal (Refs.32,43,44).   At a critical scale thickness its further
settling becomes impossible and a gap is formed between it and the
metal.   A new scale layer forms on the core, the oxidizing agent
being supplied by dissociation of the outer layer.   Metal ions and
electrons produced by this dissociation diffuse outwards through the
outer layer and combine with sulphur.   Further growth of the outer
layer depends on bridging across the gap.   The mechanism is shown
schematically in Fig.1.   The authors criticize the usual
interpretation of the location of the inert marker in the scale at
the boundary of two layers as evidence of diffusion in both
directions.   This effect, the authors show, can be explained in
terms of their proposed mechanism: Figs.2 and 3 show photomicro-
graphs of the boundary regions in experiments with copper and silver
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Some Basic Problems in Studying the Oxidation of Metals

respectively, containing 7×10^{-3} cm diameter platinum wire
markers; Fig.4 refers to silver for a comparatively short duration
of scaling.   Professor L.Czerski made valuable suggestions for this
work.   There are 4 figures and 2 tables and 48 references:
4 Soviet, 14 English, 14 German, 3 French, 9 Polish, 1 Private
communication and 3 in Acta Met.

ASSOCIATION: Gorno-metallurgicheskaya akademiya Pol'skaya
             Narodnaya Respublika g. Krakov (Mining-Metallurgical
             Academy of the Polish Peoples Republic, Cracow)

SUBMITTED: March 1, 1960

Card 3/3

Distr: 4E2c

Kinetics of sulfurization of aluminum at higher temperatures. Stanisław Mrowec, Krystyna Wallischowa, and Teodor Werber (Akad. Górniczo-Hutnicza, Kraków, Poland). Roczniki Chem. 34, 337-9(1960)(German summary).
—Expts. were made to det. whether the known resistivity of Al against sulfurization is due to the existing Al$_2$O$_3$ layer or to the formation of Al$_2$S$_3$. Sulfurization at 400 and 444° takes place according to a parabolic law that seems to prove the 2nd alternative.   A. Kręglewski

CZERSKI, Lucjan; MROWEC, Stanislaw; WERBER, Teodor

Kinetics of the sulfurization of copper in liquid sulfur. Rocz chemii
34 no.2:573-586 '60.   (EEAI 10:1)

1. Katedra Chemii Gorniczej Akademii Gorniczo-Hutniczej, Krakow
       (Copper)   (Sulfur)   (Sulfuration)

26473
P/038/61/006/001/002/002
A076/A126

18.8300

AUTHOR: Mrowec, Stanisław

TITLE: Mechanism of metal oxidation at high temperature

PERIODICAL: Archiwum Hutnictwa, v. 6, no. 1, 1961, 61 - 82

TEXT: The main problem in investigations concerning the mechanism of the oxidation of metals is the recognition of the diffusion mechanism of the individual reagents through the scale forming and their relative part played in the whole process of diffusion. The results of present investigations on the mechanism of oxidation of metals in high temperatures confirmed the fundamental assumption of Wagner's theory [Ref. 5: C. Wagner, Z. physik. Chem. 21, 1933, 25; Ref. 6: C. Wagner, Z. physik. Chem., 32, 1936, 447], but some experimental facts like the formation of a double-layer scale of the same chemical composition for both of them can not be explained by this theory. Investigations on the basis of the marking method, for example, show that the increase of the double-layer scales demonstrat- ing defects in the space lattice exclusively in the cation sphere of the lattice occurs, as a rule, in consequence of a two-directional diffusion of both reagents. metal and oxidizer. The results of these investigations are in contradiction to

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A076/A126

Mechanism of metal oxidation at high temperature

Wagner's theory and to the results of the measurements concerning self-diffusion. In order to explain these contradictions, investigations of the mechanism of sulfurization of copper and silver with the application of a radioactive isotope of sulfur 35S were carried out. The purpose of these investigations was to explain the role of diffusion of sulfur, played in the process of formation of a double-layer sulfide scale on these metals, and does it really take part in the inward diffusion . These investigations were carried out in liquid sulfur at 444°C. Tests were made with spectral pure copper, 99.999% Cu and silver containing 99.97% Ag. Ash content in sulfur did not exceed 0.03%. Preliminary tests showed that oxidation scale was 3.10⁻² cm thick which absorbed β rays emmitted by isotope 35 S. The author gives a new model of the mechanism of formation of a double-layer scale on metals. According to this model the formation of an inner porous layer is related to the formation of a fissure between the metal and the scale as a result of limitations in the dimensions of the specimens and the plastic flow of the scale. The formation of this fissure permits the dissociation of the scale on the phase boundary scale/fissure, and a secondary process of the formation of a metallic compound with the oxidizer on the core surface. In result of this process the fissure partly fills up so that the contact between external scale layer and the

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A076/A126

Mechanism of metal oxidation at high temperature

metallic core is partly restored. Investigations into the kinetics of the in-
crease of individual layers of the sulfide scale on copper indicated that the
process of formation of the internal porous layer occurs approximately according
to the linear law, while the increase of the whole scale occurs according to the
parabolic law. From this it results that the slowest partial process determining
the formation rate of the internal layer of the sulfide scale on copper is the
dissociation process of the cuprous sulfide of the external layer of the scale.
The author's investigations indicated that a conventional interpretation of the
results of investigations, by marking in relation to a double-layer scale, is
not accurate and requires corrections. Till now it was assumed that the localiza-
tion of the marker in the scale between two of its layers means that an increase
of the scale occurs as a result of a simultaneous diffusion of both reagents: an
outward diffusion of the metal permitting the formation of the external scale and
an inward diffusion of the oxidizer causing the formation of the internal porous
layer. In case of sulfurization of copper and silver it was stated that an in-
crease of the double-layer scale on these metals occurs exclusively by the outward
diffusion of the metal while the localization of the marker in the scale indicates
the two-directional diffusion of both reagents. The author discusses the results
of marking in relation to a case of a double-layer scale. It results from this

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A076/A126

Mechanism of metal oxidation at high temperature

discussion that it is necessary to carry out a series of measurements related to the time of the reaction. If the marker, regardless to the time of oxidation is always found in the external layer of the scale on the boundary of the internal one, then it may indicate the presence of a two-directional diffusion of both reagents, i.e. the systems Ni-O. But when the successive increase occurs in the thickness of the scale with the marking being first in the external compact layer, and changing then into the porous internal one, this indicates the existence of a restoring process, i.e. dissociation, of the external layer of the scale. The investigations of the marking can in no case be applied to quantitative measurements. The author thanks Professor Doctor Lucjan Czerski and Professor, Doctor Carl Wagner of the Max Planck Institute of Physical Chemistry in Goettingen, West Germany, for help given in preparing and conducting investigations. There are 2 tables, 7 figures, 12 photos and 56 references: 25 Soviet-bloc and 31 non-Soviet-bloc. The references to the four most recent English-language publications read as follows: C. Birshenall R. Meussner Corrosion 13, 1957, 677; B. Hansen, K. Anderko Constitution of binary alloys, Mc Graw-Hill N.Y. 1958; W. Moore, v. Chem. Physics 21, 1953, 1117; R. Carter, F. Richardson, J. Metals 7, 1955, 336.

Card 4/5

26473
P/038/61/006/001/002/002

Mechanism of metal oxidation at high temperature   A076/A126

ASSOCIATION: Katedra Chemii Górniczej Akademii Górniczo-Hutniczej, Kraków (Depart-
ment of Mining Chemistry, Academy of Mining and Metallurgy, Kraków)

SUBMITTED: February 27, 1960

Card 5/5

P/038/61/006/004/003/003
E040/E935

AUTHOR: Mrowec, Stanislaw

TITLE: The mechanism of hetero-phase scale formation on
binary alloys

PERIODICAL: Archiwum hutnictwa, v.6, no.4, 1961, 327-361

TEXT: Corrosion protective films formed on the surface of
high-temperature alloys have properties which depend mainly on
their concentration of lattice imperfections through which the
underlying ions of metal and oxidizing agent can diffuse. Usually
the selection of refractory alloys is based on results of extensive
practical tests rather than on theoretical grounds simply because
of insufficient knowledge of such processes. The reason for it
lies in experimental difficulties associated with studies of the
mechanism of gaseous diffusion through such poly-phase, multi-
component type corrosion protective films and scales. Hence, the
corrosion processes are usually investigated on model studies in
which test refractory alloys are exposed to controlled attack of
aggressive atmosphere. In the present investigation an attempt
was made to obtain experimental verification of Wagner's theory
Card 1/5

The mechanism of hetero-phase...   P/038/61/ 6/ 4/ 3/ 3
                                        704 / 45

(Refs.7-8, J. electrochem. Soc.105, 1956, 571 and 6 7, by examining
the mechanism of hetero-phase scale formation on binary u- n,
Ag-Zn, Cu-Ni and Cu-Au alloys exposed to the action of molt
radioactive sulphur (S35) using apparatus described prev ou y
the present author (Ref.10: Archiw. Hutn. AN 6, 1 ,
test alloys were sulphurized until the scale t   wa
sufficient for complete absorption of -rad   f m n
isotope. Without interrupting the test, 5 w   n   i   lu d
into the reaction medium and the sulphurization cont   for
definite time periods, after which the scale formed was p led off
the specimen's surface and the radioactivity of the top and
bottom surfaces of the scale specimens was determine . t w
found that irrespective of the time of sulphurizat   n m   , the
internal surface of the scale formed on Cu- n, Ag- ,
Cu-Au alloys shows the presence of radioactive ilphu .
results thus indicate that the scale growth on th e l
compatible with inward diffusion of sulphur,   u a e
Cu-Ni alloy spe imen , such inward dif ion wa e i
absent.   upplemen ry   t   irr d that in l n ir at on of
ru A

The mechanism of p... c:0-[...   ?/038/61/006/004/0.4/
B040/?)55

Cu-Zn alloys, the formation of the inner hetero-phase layer is
almost exclusively due to the inward diffusion of sulphur. Studies
of the mechanism of sulphur diffusion led to the conclusion that
sulphur does not diffuse through the crystal lattice in the form
of sulphur ions but that sulphur atoms or molecules penetrate
through the cracks present in the scale. Significant submicro-
porosity was detected in the external scale layer formed on Cu-Zn
and Ag-Zn alloys, the pore diameter being less than 10^5 A. The
investigations showed that in sulphurization of the Cu-Zn alloys,
the growth of the heterophase sulphide scale results from a
simultaneous and two-directional diffusion of the more noble metal
and the oxidizer through the scale. The less noble metal takes
practically no part in the diffusion process. The more noble
metal diffuses in the form of ions through the crystal lattice
defects in the compound formed by the metal and the oxidizer and
sulphur diffuses inward into the scale in the form of electrically
neutral particles consisting of single atoms or atomic groups.
Because of the presence of cracks in the scale, the process of the
heterophase sulphide scale formation on alloys of the Cu-Zn type
differs from Wagner's model. But, in the case of Cu-Zn alloys
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The mechanism of hetero-phase...   P/038/61/006/J04/JU5/UJ3
                                           E040/E935   ✓

the heterophase sulphide scale was found to grow exclusively as a
result of the outward diffusion of both metals; this is in agree-
ment with Wagner's theoretical model. Acknowledgments are ex-
pressed to Professor L. Czerski for advice and to T. Werber for
assistance and advice. The work was carried out on the instruct-
ions of the Komisjia Nauk Technicznych Krakowskiego Oddziału
Polskiej Akademii Nauk (Commission for Technical Sciences of the
Craco · Branch, Polish AS). There are 14 figures, 9 tables and 53
references (14 Soviet-bloc and 39 non-Soviet-bloc). The four
latest English-language references read as follows· Ref.12:Lichter
B., Wagner C., J. elektrochem.Soc.107, 1960, 168; Ref.20: Moore W.,
Allen R., J. physic. Chem.63, 1959, 223; Ref.25· Sarcail C., Bendel
S., Johnson T., Li C., Trans.ASM 50, 1958, 1047; Ref.41: Goldman J.,
Gregg S., J. Chem. Soc. 1956, 3612.

ASSOCIATION: Katedra chemii górniczej Akademii górniczo-hutniczej,
               Kraków (Department of Mining Chemistry of the
               Academy for Mining and Metallurgy, Cracow)

SUBMITTED: March, 1960
Card 4/4

SHTUKMAN, A.; MROVETS, S.; VERBER, T.

Investigating the mechanism of the reaction diffusion in the system nickel - sulfur. Fiz. met. i metalloved. 11 no. 5:704-708 My '61. (MIRA 14:5)

1. Gorno-metallurgicheskaya Akademiya, Pol'skaya Narodnaya Respublika, Krakov.   (Nickel—Corrosion)   (Protective coatings)

S/081/62/000/023/011/120
B149/B186

AUTHORS: Mikulski, Jan, Stroński, Ignacy, Mrowec, Stanisław, Werber, Teodor

TITLE: Investigation of sulfide formation of metals and alloys, using isotope S^{35}.

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 23, 1962, 84-85, abstract 23B611 (Pierwsze krajowe sympoz. zastosowań izotopów techn., Rogów, 8-12 czer., 1960 . Warszawa, no. 20, 1961 [Pol.; summaries in Russ. and Eng.])

TEXT: Labelled atoms were used to investigate the mechanism of the oxidation of Cu and Ag and of the alloys Cu-Zn and Ag-Zn in liquid sulfur (445°C. It was observed that during sulfidation of metals (Cu and Ag) these metals diffused from the outside through the layer of reaction products. In the sulfidation of the alloys, a hetero-phased layer of dross formed as a result of the simultaneous transfer of the metal and of sulfur. [Abstracter's note: Complete translation.]

Card 1/1

S/081/62/000/020/013/040
B158/B101

AUTHORS: Brückman, Andrzej, Mrowec, Stanislaw, Werber, Teodor

TITLE: Investigation of the mechanism of scale formation during corrosion of metals at high temperatures

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 20, 1962, 306, abstract 20I212 (Pierwsze krajowe sympoz. zastosovań izotopow techn., Rogów, 8-12 czer., 1960. Warszawa, no. 22, 1961 [Pol.; summaries in Russ. and Eng.])

TEXT: The principles of applying radioactive isotopes to characterize the diffusion of different reagents through a layer of scale formed on metal at a high temperature are examined with a view to studying the processes of oxidation on a metal surface. The mechanism whereby a Cu-Zn alloy containing 9 at% Zn is oxidized in liquid S at 444°C was studied with the aid of Zn65 by applying a 5-10 μ film of Cu-Zn containing the Zn65 to the surface of the specimen and determining the activity of the individual layers of scale formed after 30 and 120 min.

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S/081/62/000/020/013/040
B158/B101

Investigation of the mechanism ...

The radioactive Zn was detected only in the outer 50 μ layer of scale and was independent of the total scale thickness. This shows that under the condition here examined Zn plays practically no part in the general process of reagent diffusion through the scale.

[Abstracter's note: Complete translation.]

Card 2/2

MROWEC, Stanislaw; WERBER, Teodor

On the mechanism of the formation of double scale sulphide layer on copper. Rocz chemii 35 no.6:1661-1671 '61.

1. Department of Mining Chemistry, School of Mining and Metallurgy, Cracow.

41387
P/038/62/007/003/002/002
E193/E383

AUTHOR: Mrowec, Stanisław

TITLE: Mechanism of oxidation of metals at elevated temperatures

PERIODICAL: Archiwum hutnictwa, v. 7, no. 3, 1962, 251-264

TEXT: In continuation of his earlier work (Archiwum hutnictwa, 6, 1961, 61) the present author postulates a model of the formation of a double oxide layer on a metal for the case when the compound, constituting the scale, has a defect-free anion lattice and when the Pilling and Bedworth coefficient for the system is greater than unity.   It is postulated that a single-layer scale is formed as long as the scale is sufficiently thin and, therefore, capable of compensating the decrease in the volume of the underlying metal caused by outward diffusion of the metal ions and so maintaining direct contact with the metal. When the scale attains a certain critical thickness, fissures are formed between the scale and the metal and conditions are created which favour the formation of a double-layer scale. The outer scale continues to be formed as a result of outward

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Mechanism of oxidation P/038/62/007/003/002/002
                                   E193/E383

diffusion of the metal ions and electrons through the lattice
defects of the compound MeX (where Me signifies the metal
and X the oxidizing medium). The inner layer is formed as a
result of the following secondary processes: a) dissociation
of the compound MeX taking place in the outer layer at the
MeX/fissure interface; b) outward diffusion of the ions and
electrons of the metal formed as a result of dissociation of
MeX to the surface of the scale (i.e. to the MeX/X_2 interface),
where they react with the oxidizing medium X_2 ; c) inward
diffusion of molecules of the oxidizing element formed as a
result of dissociation of MeX to the surface metal core, where
they react with the metal to form MeX. The schematic represen-
tation of the model is reproduced in Fig. 3, where Me and X_2
denote, respectively, the metal and the oxidizing element.
Theoretical considerations led the present author to conclude
that the relative values of the partial pressure of the
oxidizing element at the MeX/X_2 interface $(p_{X_2}^{II})$ and at the

Card 2/4

Mechanism of oxidation ....

P/038/62/007/003/002/002
E193/E383

MeX/fissure interface $(p_{X_2}^{(i)})$ determine the mechanism of the formation of the inner layer. When:

$$p_{X_2}^{(i)} \text{(calculated)} \ll p_{X_2}^{II} \qquad\qquad (12a) ,$$

the inner-scale layer can be formed in accordance with the model described above; when:

$$p_{X_2}^{(i)} \text{(calculated)} > p_{X_2}^{II} \qquad\qquad (12b) ,$$

another mechanism must operate. Calculations carried out by the present author for the Ag-S, Cu-S, Fe-S, Ni-S, Ni-O, Co-O and Fe-O systems showed that the formation of a double-layer scale in accordance with the model proposed is possible in all these systems with the exception of the Fe-O system.
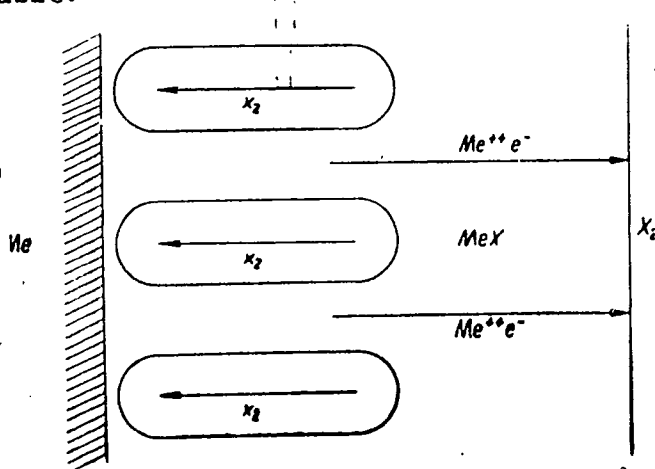
Card 3/4

Mechanism of oxidation ....

P/038/62/007/003/002/002
E193/E383

The precise mechanism of oxidation of Fe (and possibly Ni and Co) at high temperatures can be determined only by the radioactive-tracer technique with the aid of the O^{18} isotope. There are 5 figures and 1 table.

SUBMITTED: November 7, 1961

Fig. 3:

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MROVETS, S. [Mrowec, S.]; VERBER, T.

Kinetics of sulfidizing cobalt at high temperatures. Fiz.met.i
metalloved. 14 no.5:770-774 N '62.   (MIRA 15:12)

1. Gorno-metallurgicheskaya Akademiya, Pol'skaya Narodnaya
Respublika, g. Krakov.
            (Cobalt)   (Protective coatings)

MROWEC, Stanislaw; WERBER, Teodor

Contribution to studies on the mechanism of oxidation of cobalt
at high temperatures. Rocz chemii 36 no.1:159-162 '62.

1. Department of General and Coal Chemistry, Institute of Mining
and Metallurgy, Krakow.

MROWEC, Stanislaw; WERBER, Teodor

Kinetics and mechanism of nickel-sulfur reaction. Pt. 2. Archiw
hutn 9 no.3:289-304 '64.

1. Department of Inorganic Chemistry, School of Mining and
Metallurgy, Krakow.

MROWEC, Stanislaw; WERBER, Teodor

Certain current problems in studying the kinetics and mechanism
of gas corrosion of metals. Chemia stosow A 9 no.1:85-89 '65.

1. Department of Inorganic Chemistry of the School of Mining
and Metallurgy, Krakow. Submitted April 6, 1964.

MROWEC, S.; WERBER, T.; ZASTAWNIK, M.

Mechanism of the solid state reaction in the nickel—chromium—
—sulfur system. Pt.1. Bul chim PAN 13 no.1:27-32 '65.

1. Department of Inorganic Chemistry of the School of Mining and
Metallurgy, Krakow, and Department of Physics of Krakow Technical
University. Submitted October 26, 1964.

BRYUKMAN, A.; MROVETS, S.; VERBER, T.

Mechanism of reactive diffusion in the system copper - sulfur.
Fiz.met.i metalloved. 15 no.3:362-370 Mr '63.   (MIRA 16:4)

1. Gorno-metallurgicheskaya Akademiya, Pol'skaya Narodnaya
Respublika, Krakov.
                (Copper sulfide)   (Diffusion)

BRYUKMAN, A.; MROVETS, S.; VERBER, T.

Formation of a two-layer sulfide scale on copper. Fiz. met. i
metalloved. 18 no.3:467-468 S '64.   (MIRA 17:11)

1. Gornometallurgicheskaya akademiya Pol'skoy Narodnoy Respubliki,
Krakov.

MROWICKI, C.

Developmental trends in the construction of radiophonic receivers. p. 6.

RADIOAMATOR. (Publication for amateur radio operators. Title varies: before 1954, Radio Amator. Monthly.) Warszawa, Poland.
Vol.5, no.12, Dec.1955.

Monthly list of East European Accessions (EEAI) LC, Vol.9, no.1, Jan. 1959.

Uncl.

MROWIEC, Marian, mgr

The superrailroad in Japan. Przegl kolej elektrotech 11 no.12:
314-318 D '64.

P/006/62/010/003/004/006
D237/D308

AUTHORS: Mrowiec, Mieczysław and Życzkowski, Michał

TITLE: The elastic load carrying capacity of a thick-walled
                   pipe-line

PERIODICAL: Rozprawy inżynierskie, v. 10, no. 3, 1962, 517-530

TEXT: This is a generalization of M. Mrowiec's earlier
work dealing with a thin-walled pipe. Three cases are considered:
freely supported pipe, end-clamped pipe and a cylinder closed at
both ends, and all are treated collectively by introducing $\varphi = 0$,
v , $\frac{1}{2}$ respectively into the expression for the axial stress. The
upper bound of the equivalent stress δ_0 is found assuming the
Huber-Mises-Hencky hypothesis and it is shown that it can be reached
at the inner or outer radius only. The limit curves are elliptical
arcs in the Mv.p coordinate system where M = bending moment, p =
internal pressure. The dependence of the limit curves on the wall
thickness and on the parameter φ is shown graphically as well as
an example of the pattern of equal δ_0 in a cross-section of the

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P/006/62/010/003/004/006
D237/D308

The elastic load ...

pipe. There are 4 figures and 2 tables.

ASSOCIATION: Politechnika Krakowska (Cracow Polytechnic)

SUBMITTED: December 11, 1961

Card 2/2

S/081/62/000/021/029/069
B117/B101

AUTHORS: Mrowiec, Stanislaw, Werber, Teodor, Zembura, Zdzislaw

TITLE: A case of corrosion of 1X18H9T (1Kh18N9T) steel in the
petroleum industry

PERIODICAL: Referativnyy zhurnal. Khimiya, no.22, 1962, 285, abstract
21I185 (Nafta (Polska), v. 18, no. 2, 1962, 48 - 50 [Pol])

TEXT: The corrosion of condenser tubes in a petroleum distillation unit is
described. The tubes, which were made of 1Kh18N9T-type stainless steel with
a wall thickness of 2.5 mm, were useless after three months' operation
because of pitting and fissuring. Corrosion was particularly strong at the
rolled-out spots. Chemical, metallographic, and X-ray analyses revealed
intercrystalline corrosion under stress, which was accelerated by the great
temperature gradient in the condenser. [Abstracter's note: Complete
translation.]

Card 1/1

MROWINSKI, W.

For accessible and good tourist equipment. p. 6.
No. 10, Oct., 1955. TURYSTA. Warsaw, Poland.

So: Eastern European Accession. Vol 5, no. 4, April 1956

MROWINSKI, W.

MROWINSKI, W.   Industry offers new equipment.   p. 6.

Vol. 28, no. 10, Oct. 1956
TURISTA
Poland

So: East European Accession, Vol. 6, No. 5, May 1957

MROWKA, Mieczyslaw, ins.

Control circuits of heavy type shunt point drives.   Przegl
kolej elektrotech 13 no.2:34-37 F '61.

MROWKA, S.

Mathematical Reviews
Vol. 14 No. 10
Nov. 1953
Analysis

Mrówka, Stanisław. Sur une propriété des ensembles fermés et bornés. Soc. Sci. Lett. Varsovie. C. R. Cl. III. Sci. Math. Phys. 44 (1951), 76–77 (1952).

Sierpiński proved that if E is a closed and bounded set in the plane, there exist $2^{\aleph_0}$ straight lines which intersect E in precisely one point. The author proves the following conjecture of Zarankiewicz: Let E be a closed and bounded set in n-dimensional space; then there exist $2^{\aleph_0}$ hyperplanes of dimension $n-1$ which intersect E in precisely one point.

P. Erdős (South Bend, Ind.).

MROWKA, S.

"Solution of a Urysohn Problem Dealing with Universal Metric Spaces." P. 233,
(GEODEZJA I KARTOGRAFIA, Vol. 1, No. 6, 1953, Warszawa, Poland.)
Polska Akademia Nauk.)

SO: Monthly List of East European Accessions, (EMAL), LC, Vol. 3,
No. 12, Dec. 1954, Uncl.

Mrówka, S. On completely regular spaces. Fund. Math.
41, 105-106 (1954).
A simplified form of Novák's construction [see the pre-
ceding review].   *E. Hewitt* (Seattle, Wash.).